

Extra Peritoneal Complications of Colonoscopy: Case Report and Literature Review

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Abstract

A very rare complication of colonoscopy manifests as extra peritoneal air leak following colonic perforation. It may present as pneumothorax, pneumomediastinum or subcutaneous emphysema. We present here, a rare case of diagnostic colonoscopy with polypectomy resulting in a large left sided pneumothorax, pneumoperitoneum and pneumomediastinum. According to our research, only 2 cases with similar presentations after colonoscopy interventions have been reported to date.

Keywords

pneumothorax; pneumomediastinum; subcutaneous emphysema; extraperitoneal air; colonoscopy

Introduction

Colonoscopy has become one of the most commonly performed medical procedures. This is due in part to the successful promotion of colorectal cancer (CRC) screening and prevention guidelines. While its uses continue to dramatically increase, the awareness of its potential complications, both common and uncommon, becomes essential. A pooled overall rate of serious adverse events including perforations, hemorrhage, diverticulitis, cardiovascular events, severe abdominal pain, and death after diagnostic colonoscopies stands at 2.8 per 1000 procedures [1]. Reported colonoscopy complications include those related to sedation during the procedure: phlebitis, hypoxia, cardiac arrhythmias, aspiration; those related to colonic preparation: fluid and electrolyte disturbances, nausea, vomiting, abdominal bloating, abdominal discomfort, aspiration, esophageal tears, and those related to the procedure itself: perforation, bleeding, infection and gas explosion or solid organ damage. The rate of perforations after diagnostic colonoscopy reported in large studies is 0.3% and is generally less than 0.1% [2].

A very rare presentation of colonoscopic complication is extra peritoneal perforation and air leak following colonic perforation presenting as pneumothorax, pneumomediastinum or subcutaneous emphysema. The case presented here involves a diagnostic colonoscopy with polypectomy resulting in a large left sided pneumothorax, pneumoperitoneum and a minute pneumomediastinum. To our knowledge, only 2 cases of similar presentations after colonoscopy have been reported [3,4].

Case Report

A 74 years old male arrived to our emergency department via an urgent referral from his gastroenterologist with a suspected diagnosis of acute coronary syndrome. He developed an excruciating

pain in his chest 20 minutes following diagnostic colonoscopy procedure that was performed at another institution. His medical record included diverticulosis of colon found during previous diagnostic colonoscopy, peptic disease with positive culture for *Helicobacter Pylori*, ischemic heart disease status post percutaneous transluminal coronary angioplasty, hyperlipidemia, Psoriasis Vulgaris, status post laparoscopic cholecystectomy, resection of transitional cell carcinoma of the bladder and prostatectomy. He was treated with Simvastatin, Aspirin, Amlodipine, Ramipril and Methotrexate.

The diagnostic colonoscopy was performed due to changes of his bowel habits. It was performed on a well prepared bowel with insertion of the colonoscope until the ileocecal valve. During the procedure 4 polyps were resected: cold loop biopsy with polypectomy of 5 mm diameter polyp in the proximal sigmoid colon, 2 smaller polyps in the descending colon and a hot loop biopsy with polypectomy of a 9 mm polyp in the splenic flexure. Sedation before the procedure was done with intravenous Meperidine and Midazolam. During the procedure no complication was noted. 20 minutes after the end of colonoscopy, while the patient was awakening from sedation, he started to complain of epigastric pain, chest discomfort and dyspnea. An ECG showed a normal sinus rhythm without any ischemic changes. He was then urgently referred to the emergency room with suspected non ST elevation Myocardial infarction due to his cardiac medical history and the impressive clinical signs. On arrival to the emergency room in our institution the patient presented with a pulse of 95 beats per minute, blood pressure of 160/90, temperature of 36.7° per os and 93% room air saturation. The findings of his physical examination included decreased breathing sounds over his left lung, and a distended abdomen with epigastric tenderness, without any signs of subcutaneous emphysema. Abdominal palpation was negative for rebound tenderness or signs of peritoneal irritation. The physician on call in the emergency room made a working diagnosis of postpolypectomy syndrome, and thus ordered an immediate abdominal CT scan without having first performed a chest or abdominal x-ray. Abdominal CT imaging demonstrated a moderate pneumoperitoneum along with an unexpected finding of pneumothorax and collapsed lung, seen on the area of the left lung base (figure 1). Additional findings included a partially resolved pneumomediastinum, and a small area of diaphragmatic weakness with eventration noticed around the splenic flexure, surrounded by signs of stranding and attenuation of the pericolic fat with microperforation (figure 2). Due to these findings, in addition to the worsening dyspnea of the patient, a 24 french volume chest drain tube was inserted to the left chest wall with evacuation of a large air volume from the pleural space. The patient continued to be stable without any signs of peritonitis and was treated conservatively with antibiotics, analgesics and a regime of nil per os. The patient continued to be in stable condition with no fever or general peritonitis symptoms in the following days while hospitalized. He was discharged 4 days later in good clinical condition.

Discussion

Colonic perforation during colonoscopy may result from mechanical forces against the bowel wall, barotrauma, or as a direct result of therapeutic procedures. Mechanical causes of perforation include forceful insertion of the colonoscope, and excessive stretching of the colon. Colonic barotrauma occurs as a consequence of increased intraluminal air pressure causing spread of the muscularis propria fibers and subsequent mucosal herniation through the muscularis eventually causing rupture [5].

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wall, barotrauma, or as a direct result of therapeutic procedures. Mechanical causes of perforation include forceful insertion of the colonoscope, and excessive stretching of the colon. Colonic barotrauma occurs as a consequence of increased intraluminal air pressure causing spread of the muscularis propria fibers and subsequent mucosal herniation through the muscularis eventually causing rupture [5].

Rarely, following colonoscopy, air may accumulate in certain extraperitoneal body cavities such as the mediastinum, scrotum, subcutaneous tissues, or pleura [6]. The subcutaneous tissue offers the least resistance to expansion and thus, subcutaneous emphysema is usually the first to manifest [7]. Later, a continuum of fascial planes connects cervical soft tissues with the mediastinal cavity, creating pneumomediastinum. Furthermore, rupture of the mediastinal pleura due to high pressure of insufflated air may lead to pneumothorax [8].

High intra abdominal pressure may cause pneumothorax via multiple anatomical transphrenic hiatuses such as the Esophageal, Aortic, Caval, Morgagni and via continuous endothoracic and endoabdominal fascias which envelope the pleural and parietal cavities [7]. Moreover, there are several depicted syndromes of defects in the diaphragm, mostly in the tendonous part, which allow a transphrenic leak from the peritoneal to the pleural cavity [9].

Due to the rare aspect of this phenomenon, to this date it has only been described in various case report studies. After having searched through Medline and Google Scholar databases for the Keywords: "Pneumothorax following colonoscopy", "Pneumomediastinum following colonoscopy", "Subcutaneous emphysema following colonoscopy" and "Extraperitoneal air following colonoscopy", 38 previously described cases have been found (Table 1). The first described cases date as far back as 1975, where reports of this phenomenon were relatively scarce, yet as the years progressed, we see a gradual increase in incident reports, also possibly due to the increased use of colonoscopies as a screening method.

The collection of previously described cases of extraperitoneal air leak following colonoscopy includes 12 males and 26 females, of varying ages, with a mean age of 62. Most of them suffered from Pneumothorax (23 cases), Subcutaneous emphysema (25 cases) and pneumomediastinum (22 cases). Most of the patients developed symptoms during or immediately after colonoscopy, but at least 10 patients looked for medical help minutes or even hours after the end of colonoscopy (1-48 hours).

The most prevalent area of perforation depicted on the case reports was the Sigmoid colon. Several cases are characterized by perforations in the Transverse colon, Cecum, Rectum and Splenic flexure. The management was either surgical, conservative or endoscopic. The choice to perform conservative treatment or endoscopic clipping was usually determined by the condition of the patient, and absence of signs of peritonitis. Surgical treatment was generally indicated for when the patients condition was poor, or when there were peritoneal signs [10].

In our literature review we found 20 cases treated successfully with conservative treatment of antibiotics, nil per os regime and chest drainage when needed. 17 cases were treated surgically, all laparotomies, except for one, treated laparoscopically. It should be noted that an endoscopic treatment with an additional colonoscopy, and clipping of the perforated area, is also a treatment option if the patient is in stable condition [11]. We have found only one record of mortality attributed to extraperitoneal air leak during colonoscopy [12]. One other patient survived after cardio pulmonary resuscitation during colonoscopy due to pneumoperitoneum with abdominal compartment syndrome

and right sided pneumothorax [13]. Only 2 previous cases were characterized by the same clinical manifestation as our presented case: Pneumothorax and Pneumomediastinum without any signs of subcutaneous emphysema, following a colonoscopic procedure [3,4]

In the majority of the previously described cases, the onset of symptoms was accompanied by an identifiable physical finding such as subcutaneous emphysema, pneumoscrotum, or extreme distention and sensitivity of the abdomen. In contrast, the findings described in our case involved crushing chest pain followed by dyspnea without clear physical signs. This type of clinical presentation might be misleading, and as in our case, may initially be inaccurately diagnosed as an acute coronary syndrome.

Radiological assessment of the chest and abdominal CT findings of our patient revealed a weakness of the diaphragm in the region of the splenic flexure, as well as regional air bubbles and fat attenuation. We can't state conclusively where exactly the perforation occurred, because operative treatment was not indicated in the case of our patient. However, considering the radiologic findings, we may speculate that the site of perforation was the splenic flexure, where a hot loop biopsy and polypectomy of a 9mm polyp was performed. Injury of the colon in the splenic flexure might have caused a straight microperforation of the adjacent diaphragm or a leak through one of thansphrenic pathways.

Conclusion

In conclusion, although extraperitoneal air leak during or immediately after colonoscopy is very rare, it may manifest in various clinical scenarios and with various times of onset. This diagnosis should be taken in consideration in every patient presenting with sequel as following colonoscopy procedure.

Figures



Figure 1. Abdominal CT scan on arrival, demonstrating large left Pneumothorax in the bases of lungs.

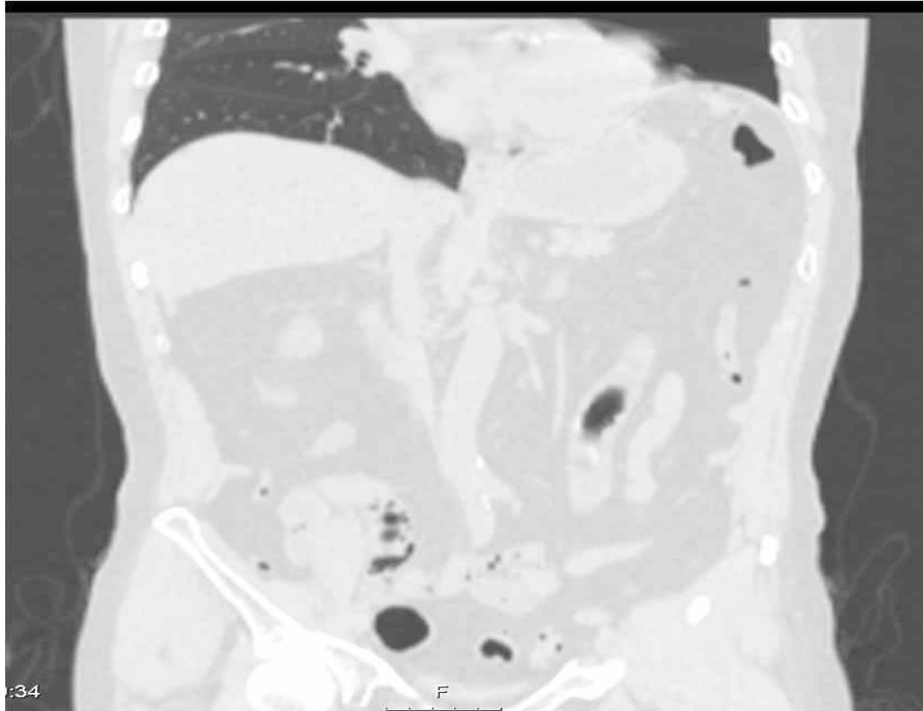


Figure 2. Abdominal CT scan on arrival, demonstrating eventration of the pericolic fat with microperforation around the splenic flexure (presented in lung window).

Table

Table 1. Reported case studies of extra peritoneal air leak during colonoscopy

Abbreviations: PNX- Pneumothorax; PM - Pneumomediastinum; SE - Subcutaneous Emphysema; R- Right; L- Left; M-Male; F- Female

Location of Perforation	Onset of Symptoms	SE	PM	PNX	Sex	Age	Author	Year
Transverse Colon	Immediate		s	R	M	68	Morton A. et al ³	1975
Cecum	hours-3	s	s	R,L	F	47	Thomas JH et al ¹⁴	1979
Rectum	Minutes		s		M	61	YASSINGER S. et al ¹⁵	1978
	hours-4	s	s	L	F	59	Schmidt G et al ¹⁶	1986
Transverse Colon	immediate	s			F	39	S. D. Fitzgerald et al ¹⁷	1992
Sigmoid Colon	Immediate	s		R	F	65	Tam W.C. et al ¹⁸	1996
Cecum	Immediate	s		R,L	M	68	Hao Chin Ho et al ¹⁹	1996
	Immediate	s		R,L	F	72	Webb T. et al ²⁰	1998
Splenic flexure	Immediate		s	L	M	65	Baumann U.A. et al ⁴	1999
Sigmoid Colon	hours-2	s	s		F	80	Hirofumi Ota et al ²¹	2003
	Minutes	s			M	50	Sanjay Sangwan et al ²²	2003
	Immediate				F	80	Hearnshaw et al ²³	2003
Iliocolic Anastomosis	Immediate			R,L	F	77	Ball C.G. et al ²⁴	2006
					F	64	Zeno B.R. et al ²⁵	2006
Sigmoid		s	s		F	46	Park, N.-S. et al ¹¹	2007
	immediate	s	s	R	F	89	Marwan et al ²⁶	2007
	hours		s		M	75	-Lovisetto et al ²⁷	2007
	hours-6				M	46	-Alabraba et al ²⁸	2008
	Immediate	s		R,L	f	40	Bouma, G. et al ²⁹	2009
Sigmoid colon	hours-2	s	s	R,L	m	77	Erdogan et al ¹²	2009
Sigmoid colon	Hour-1	s		L	m	54	Ignjatovic et al ³⁰	2009
Sigmoid colon	minutes-5		s		f	54	Fazeli et al ³¹	2009
Splenic flexure				R	m	35	Ring et al ³²	2009

Sigmoid colon	hours-8	s	s	L,R	m	78	Kipple ³³	2010
	immediate	s	s	L,R	f	77	Chan et al ³⁴	2010
Rectum	hours-48	s	s		f	82	Hong et al ³⁵	2011
	hours-6	s	s		f	58	Loughlin et al ³⁶	2012
Sigmoid colon	hours	s	s		f	50	Murariu et al ³⁷	2012
Sigmoid colon	immediate	s	s		f	78	Falidas et al ³⁸	2012
		s	s	L	f	64	Pekçolaklar et al ³⁹	2012
	-several hours-			R	f	37	Tang et al ⁴⁰	2012
	immediate	s		R	f	63	Lau et al ⁴¹	2012
	immediate	s		L,R	F	65	Đuri et al ⁴²	2013
Colosigmoid Junction	immediate	s	s		F	71	Ho Kim et al ⁴³	2013
-No perforation on CT	Immediate	s		L	F	84	Pourmand A et al ⁴⁴	2013
-No perforation seen during surgery	minutes	s	s		M	55	Dehal et al ⁴⁵	2014
	minutes		s		F	60	Ramsingh et al ⁴⁶	2014
-Rectosigmoid junction	Immediate	s	s		F	60	Palomeque et al ⁴⁷	2015

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Manuscript Information: Received: January 13, 2016; Accepted: March 24, 2016; Published: March 25, 2016

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Citation: Goldenshluger M, Kalmar E, Yoffe B. Extra peritoneal complications of colonoscopy: Case report and literature review. Open J Clin Med Case Rep. 2016; 1095

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